

FCC PART 90 TEST REPORT

For

Quanzhou Wouxun Electronics Co., Ltd.

Jiangnan High Technology Industry Park No.928 Nanhuan Road, Quanzhou, Fujian, China

FCC ID: WVTWOUXUN11

| | |
|--|---|
| Report Type: Original Report | Product Type: Digital Two-way Radio |
| Test Engineer: Costa Dong | <i>Costa Dong</i> |
| Report Number: RXM160505051-00 | |
| Report Date: 2016-06-24 | |
| Reviewed By: Dean Liu RF Engineer | <i>Dean Liu</i> |
| Test Laboratory: Bay Area Compliant Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn | |

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliant Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Quanzhou Wouxun Electronics Co., Ltd.* 's product, model: *KG-D901 (FCC ID: WVTWOUXUN11)* (the "EUT") in this report is a *Digital Two-way Radio*, which was measured approximately: 12.4 cm (L) x 6.4cm (W) x 3.4 cm (H), rated input voltage: DC7.4V or 7.95V from rechargeable battery and DC12 V from adapter.

Adapter information:

MODEL:CA-001

INPUT: AC100-240V 50/60Hz 0.3A Max

OUTPUT: DC12V ,500mA

Note: The series product, models KG-D901, KG-D900, KG-D902, KG-D903, KG-D905, KG-D2000(UV), KG-D3000(UV), KG-D5000(UV), KG-D6000(UV), KG-D8000(UV), KG-D9000(UV) are electrically identical, the differences between them just is the model name, we selected KG-D901 for fully testing, the details was explained in the declaration letter.

** All measurement and test data in this report was gathered from production sample serial number: 160505051. (Assigned by BACL.Xiamen). The EUT was received on 2016-05-09.*

Objective

This test report is prepared on behalf of *Quanzhou Wouxun Electronics Co., Ltd.* in accordance with Part 2, Part 90 of the Federal Communications Commission rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 90 – Private Land Digital Two-way Radio Service

Applicable Standards: TIA-603-D.

All emissions measurement was performed and Bay Area Compliant Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliant Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliant Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in Compliant with the requirements of Section 2.948 of the FCC Rules on February 06, 2015.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode.

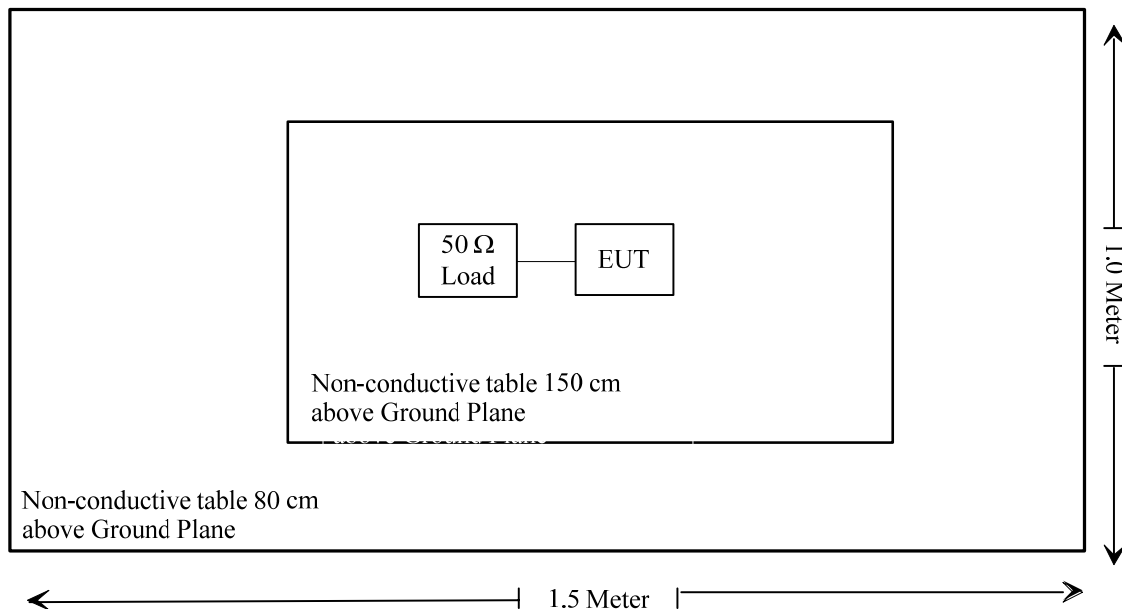
EUT Specification:

| | |
|-----------------|-------------------|
| Frequency Band | 400-470MHz |
| Modulation Mode | FM/4FSK |
| Channel Spacing | 12.5kHz |
| Output Power | High: 5W, Low: 1W |

Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|--------------|----------------------------|-------|---------------|
| / | 50 Load Terminal | 100W | / |
| HP | RF Communications Test Set | 8920A | 00 235 |

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Results |
|-----------------------------|---------------------------------------|-----------|
| FCC§1.1310 & §2.1093 | RF exposure | Compliant |
| §2.1046;§90.205 | RF Output Power | Compliant |
| §2.1047;§90.207 | Modulation Characteristic | Compliant |
| §2.1049;§90.209; §90.210 | Occupied Bandwidth & Emission Mask | Compliant |
| §2.1051;§90.210 | Spurious Emission at Antenna Terminal | Compliant |
| §2.1053;§90.210 | Spurious Radiated Emissions | Compliant |
| §2.1055; §90.213 | Frequency Stability | Compliant |
| §90.214 | Transient Frequency Behavior | Compliant |

FCC §1.1310 & §2.1093 - RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RXM160505052-20.

FCC §2.1046 & §90.205- RF OUTPUT POWER**Applicable Standard**

FCC §2.1046 and §90.205.

Test Procedure

Conducted RF Output Power:

TIA-603-D section 2.2.1

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer setting:

| RBW | VBW |
|---------|---------|
| 100 kHz | 300 kHz |

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|----------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S | Spectrum Analyzer | FSEM | DE31388 | 2016-05-09 | 2017-05-09 |
| Weinschel Corp | Attenuator(20dB) | 53-20-34 | LN749 | 2016-05-08 | 2017-05-08 |
| E-Microwave | DC Blocking | EMDCB-00036 | 0E01201047 | 2016-05-06 | 2017-05-06 |
| N/A | Coaxial Cable | 0.1m | N/A | 2016-05-06 | 2017-05-06 |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

| | |
|--------------------|-----------|
| Temperature: | 27.5°C |
| Relative Humidity: | 54 % |
| ATM Pressure: | 100.6 kPa |

The testing was performed by Costa Dong on 2016-05-15.

Test Result: Compliant. Please refer to following tables.

| Modulation Mode | Channel Separation | f _c | Reading (dBm) | | Note |
|-----------------|--------------------|----------------|------------------|-----------------|--------------------|
| | | MHz | High Power Level | Low Power Level | |
| FM | 12.5kHz | 400.0125 | 36.89 | 29.96 | Not for FCC Review |
| | | 435 | 36.87 | 29.97 | / |
| | | 469.9875 | 36.83 | 29.99 | / |
| 4FSK | 12.5kHz | 400.0125 | 36.83 | 30.05 | Not for FCC Review |
| | | 435 | 36.88 | 30.12 | / |
| | | 469.9875 | 36.81 | 30.11 | / |

Note: The rated power is 5W for high power level, 1W for low Power level.

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC**Applicable Standard**

FCC§2.1047 & §90.207:

- (a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
- (b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

Test Procedure

Test Method: TIA/EIA-603D 2.2.3

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|----------------|----------------------------|-------------|---------------|------------------|----------------------|
| HP | RF Communications Test Set | 8920A | 00 235 | 2016-05-09 | 2017-05-09 |
| Weinschel Corp | Attenuator(20dB) | 53-20-34 | LN749 | 2016-05-08 | 2017-05-08 |
| E-Microwave | DC Blocking | EMDCB-00036 | 0E01201047 | 2016-05-06 | 2017-05-06 |
| N/A | Coaxial Cable | 0.1m | N/A | 2016-05-06 | 2017-05-06 |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

| | |
|---------------------------|-----------|
| Temperature: | 27.5°C |
| Relative Humidity: | 54 % |
| ATM Pressure: | 100.6 kPa |

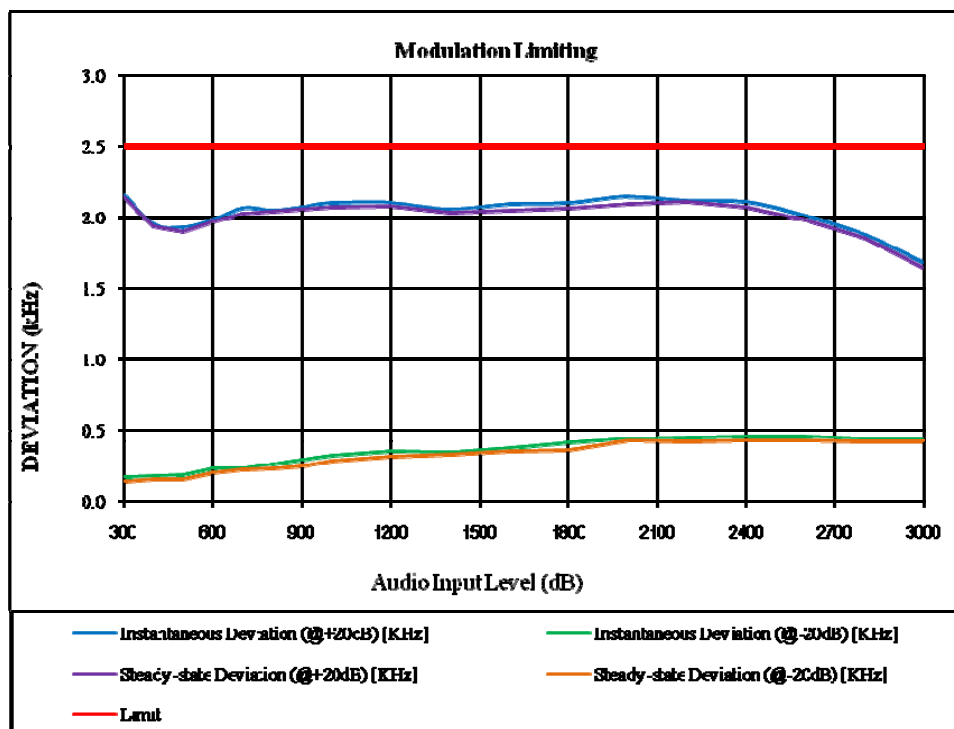
The testing was performed by Costa Dong on 2016-05-15.

Test Result: Compliant. Please refer to following table and plots.

MODULATION LIMITING

Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz

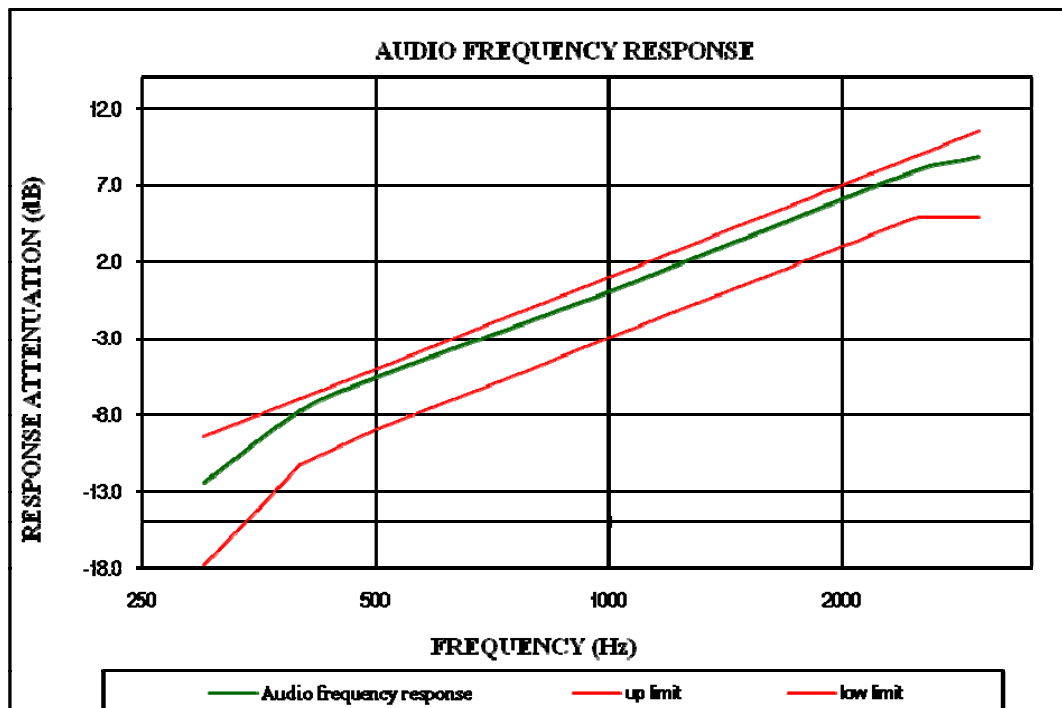
| Audio Frequency (Hz) | Instantaneous | | Steady-state | | Limit [kHz] |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
| | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] | |
| 300 | 2.161 | 0.173 | 2.142 | 0.144 | 2.5 |
| 400 | 1.95 | 0.181 | 1.94 | 0.157 | 2.5 |
| 500 | 1.929 | 0.187 | 1.901 | 0.161 | 2.5 |
| 600 | 1.98 | 0.23 | 1.971 | 0.202 | 2.5 |
| 700 | 2.067 | 0.233 | 2.03 | 0.223 | 2.5 |
| 800 | 2.052 | 0.262 | 2.042 | 0.237 | 2.5 |
| 900 | 2.074 | 0.294 | 2.059 | 0.246 | 2.5 |
| 1000 | 2.102 | 0.322 | 2.075 | 0.29 | 2.5 |
| 1200 | 2.106 | 0.351 | 2.083 | 0.315 | 2.5 |
| 1400 | 2.062 | 0.347 | 2.039 | 0.334 | 2.5 |
| 1600 | 2.093 | 0.38 | 2.053 | 0.354 | 2.5 |
| 1800 | 2.102 | 0.415 | 2.07 | 0.363 | 2.5 |
| 2000 | 2.146 | 0.447 | 2.094 | 0.427 | 2.5 |
| 2200 | 2.118 | 0.453 | 2.113 | 0.426 | 2.5 |
| 2400 | 2.11 | 0.46 | 2.073 | 0.429 | 2.5 |
| 2600 | 2.017 | 0.462 | 1.982 | 0.433 | 2.5 |
| 2800 | 1.879 | 0.443 | 1.851 | 0.424 | 2.5 |
| 3000 | 1.682 | 0.439 | 1.644 | 0.419 | 2.5 |



Audio Frequency Response

Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz

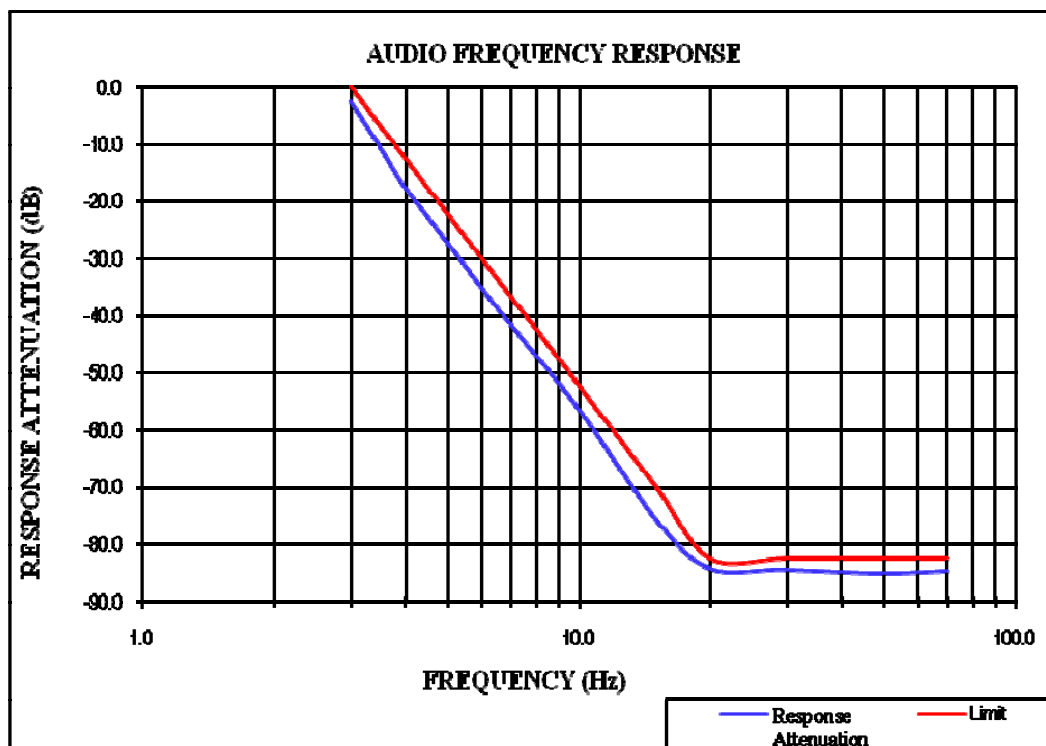
| Audio Frequency (Hz) | Response Attenuation (dB) |
|----------------------|---------------------------|
| 300 | -12.41 |
| 400 | -7.71 |
| 500 | -5.60 |
| 600 | -4.06 |
| 700 | -2.84 |
| 800 | -1.79 |
| 900 | -0.83 |
| 1000 | 0.00 |
| 1200 | 1.59 |
| 1400 | 2.96 |
| 1600 | 4.10 |
| 1800 | 5.15 |
| 2000 | 6.11 |
| 2200 | 6.92 |
| 2400 | 7.64 |
| 2600 | 8.23 |
| 2800 | 8.51 |
| 3000 | 8.80 |



Audio Frequency Low Pass Filter Response

Carrier Frequency: 435 MHz, Channel Spacing = 12.5 kHz

| Audio Frequency | Response Attenuation | Limit |
|-----------------|----------------------|-------|
| kHz | dB | dB |
| 3.0 | -2.4 | 0.0 |
| 3.5 | -10.4 | -6.7 |
| 4.0 | -17.7 | -12.5 |
| 5.0 | -27.2 | -22.2 |
| 7.0 | -41.8 | -36.8 |
| 10.0 | -56.3 | -52.3 |
| 15.0 | -75.6 | -69.9 |
| 20.0 | -84.3 | -82.5 |
| 30.0 | -84.4 | -82.5 |
| 50.0 | -85.1 | -82.5 |
| 70.0 | -84.6 | -82.5 |



FCC §2.1049&§90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049, §90.209 and §90.210

| Applicable Emission Masks | | |
|---------------------------|---|--|
| Frequency band (MHz) | Mask for equipment with audio low pass filter | Mask for equipment without audio low pass filter |
| Below 25 | A or B | A or C |
| 25-50 | B | C |
| 72-76 | B | C |
| 150-174 | B, D, or E | C, D or E |
| 150 paging only | B | C |
| 220-222 | F | F |
| 421-512 | B, D, or E | C, D, or E |
| 450 paging only | B | G |
| 806-809/851-854 | B | H |
| 809-824/854-869 | B | G |
| 896-901/935-940 | I | J |
| 902-928 | K | K |
| 929-930 | B | G |
| 4940-4990 MHz | L or M | L or M |
| 5850-5925 | | |
| All other bands | B | C |

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.
- (4) The reference level for showing Compliant with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show Compliant with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|----------------|----------------------------|-------------|---------------|------------------|----------------------|
| R&S | Spectrum Analyzer | FSEM | DE31388 | 2016-05-09 | 2017-05-09 |
| HP | RF Communications Test Set | 8920A | 00 235 | 2016-05-09 | 2017-05-09 |
| Weinschel Corp | Attenuator(20dB) | 53-20-34 | LN749 | 2016-05-08 | 2017-05-08 |
| E-Microwave | DC Blocking | EMDCB-00036 | 0E01201047 | 2016-05-06 | 2017-05-06 |
| N/A | Coaxial Cable | 0.1m | N/A | 2016-05-06 | 2017-05-06 |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Test Data**Environmental Conditions**

| | |
|---------------------------|---------------|
| Temperature: | 25.1~30.2 °C |
| Relative Humidity: | 54~64 % |
| ATM Pressure: | 100.2~100.6Pa |

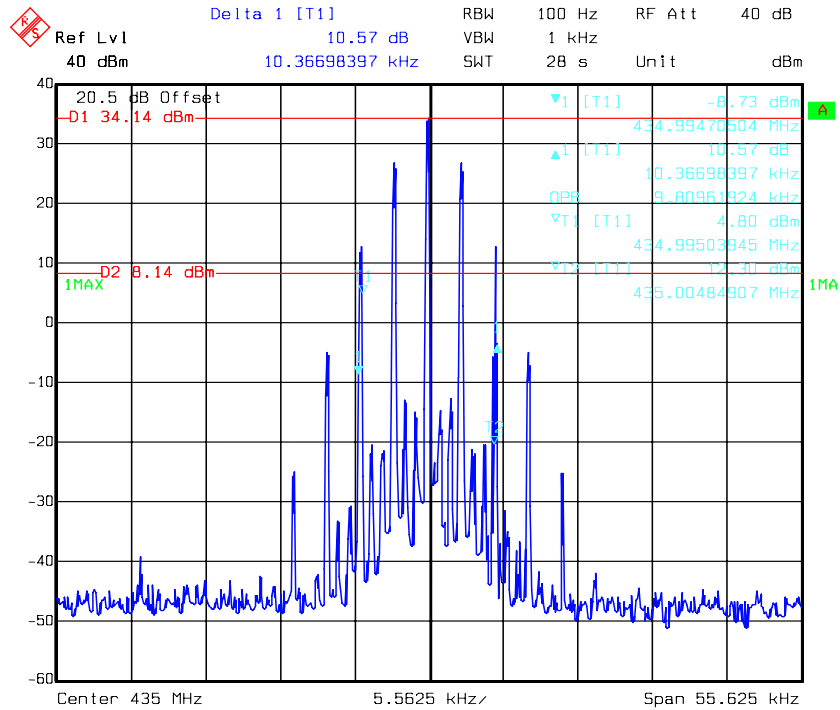
The testing was performed by Costa Dong from 2016-05-15 to 2016-07-13.

Test Result: Compliant. Please refer to the following tables and plots.

| Modulation Mode | Channel Separation | f_c | 99% Occupied Bandwidth | 26 dB Bandwidth | Emission Power |
|-----------------|--------------------|----------|------------------------|-----------------|------------------|
| | | MHz | kHz | kHz | |
| FM | 12.5kHz | 435 | 9.81 | 10.37 | High power level |
| | | | 9.81 | 10.37 | LowPower Level |
| | 12.5kHz | 453.2125 | 9.9 | 10.3 | High power level |
| | | | 10.0 | 10.4 | LowPower Level |
| 4FSK | 12.5kHz | 435 | 7.47 | 10.03 | High power level |
| | | | 7.69 | 9.81 | LowPower Level |

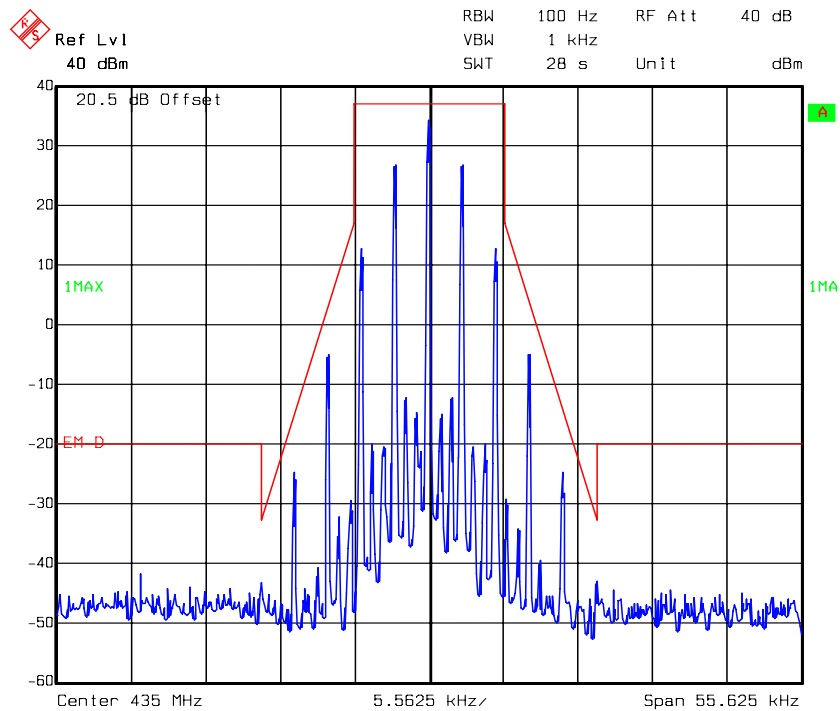
FM Mode

Occupied Bandwidth –12.5kHz, 435 MHz, High Power Level

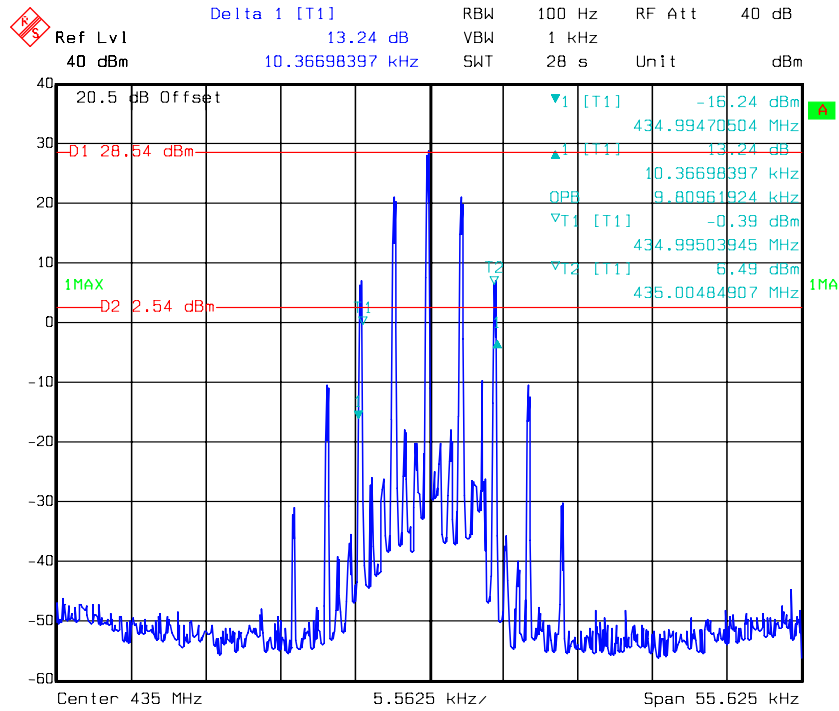
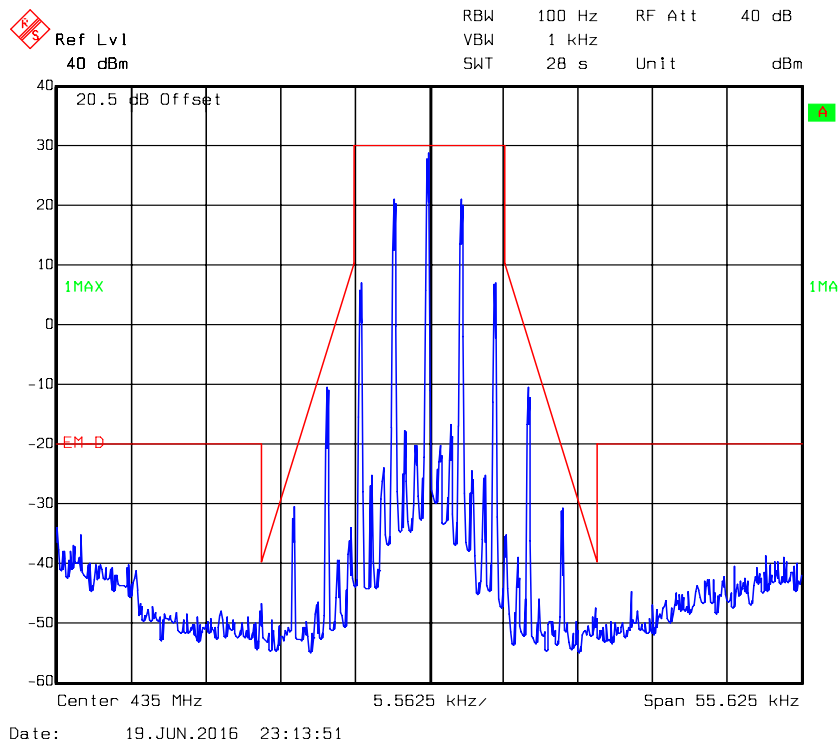


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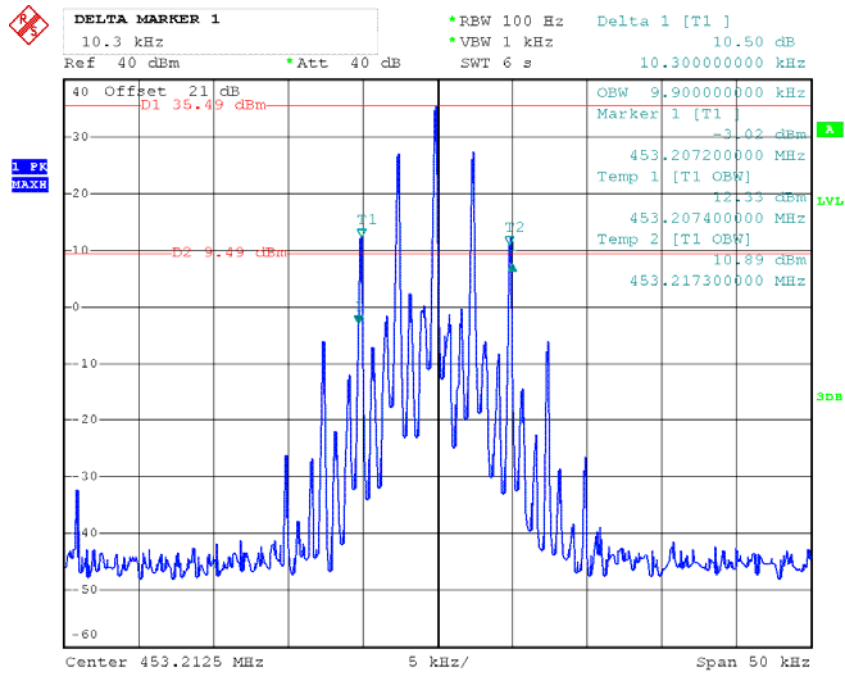
Emission Mask - Type D



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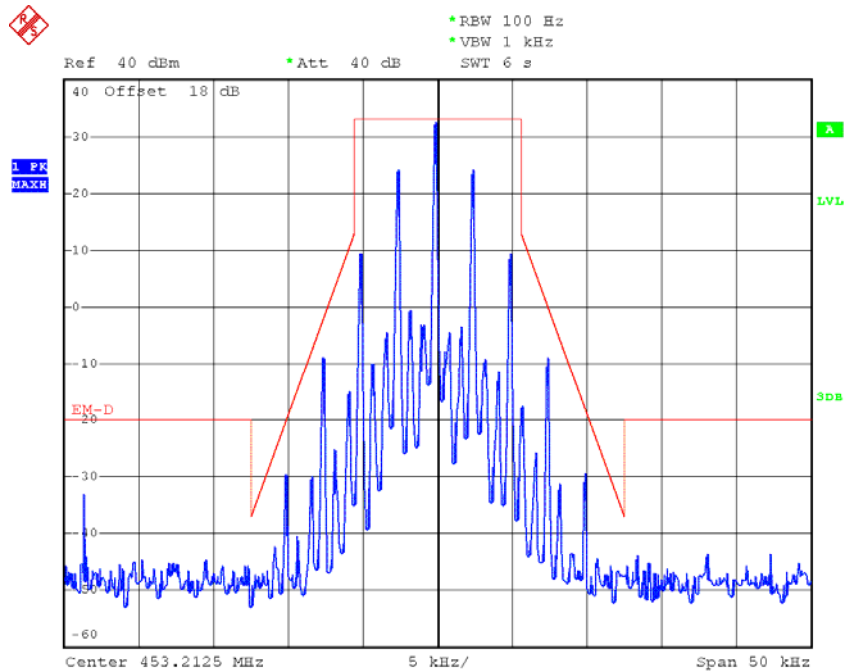
Occupied Bandwidth –12.5kHz, 435 MHz, Low Power Level**Emission Mask - Type D**

Occupied Bandwidth –12.5kHz, 453.2125 MHz, High Power Level



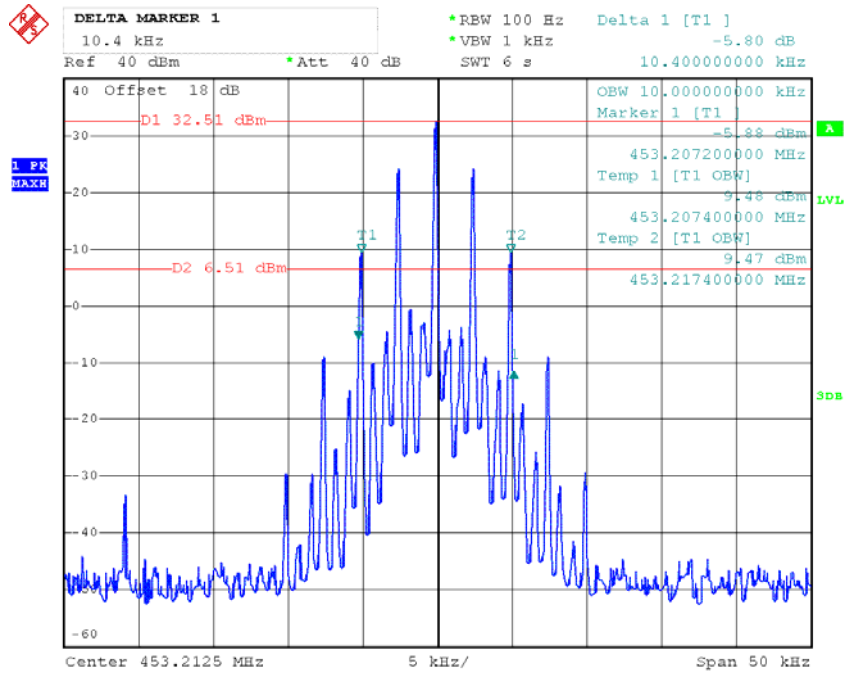
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Emission Mask - Type D



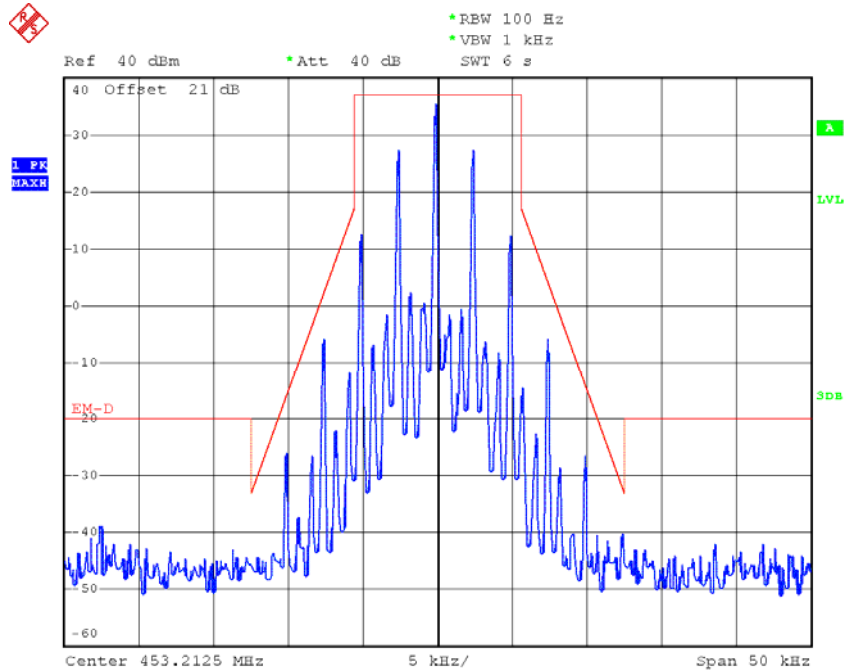
Date: 13.JUL.2016 13:30:33

Occupied Bandwidth –12.5kHz, 453.2125 MHz, Low Power Level



Date: 13.JUL.2016 11:11:01

Emission Mask - Type D



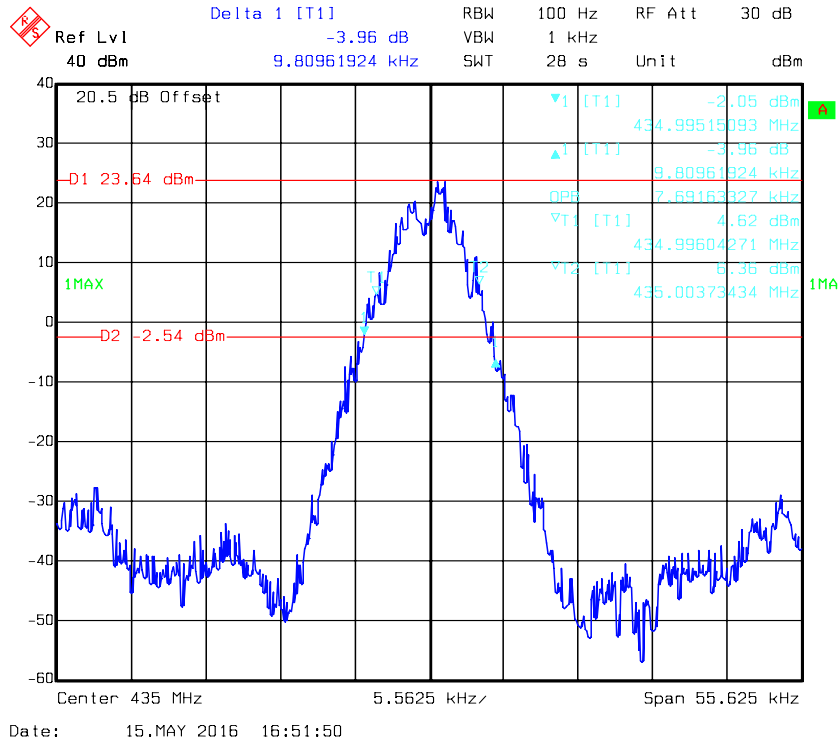
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Occupied Bandwidth – 12.5kHz, 435MHz, High Power Level

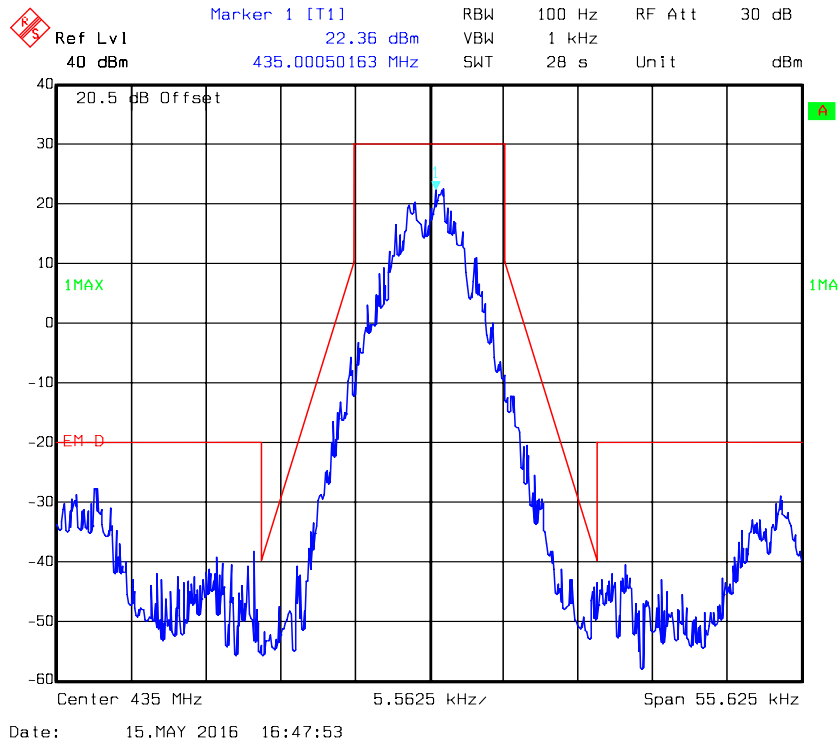


Date: 15.MAY 2016 16:38:41

Occupied Bandwidth -12.5kHz, 435 MHz, Low Power Level



Emission Mask - Type D



FCC §2.1051& §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log(P)$ dB or 70 dB, whichever is the lesser attenuation.
- (4) The reference level for showing Compliant with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show Compliant with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|----------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S | Spectrum Analyzer | FSEM | 831259/019 | 2016-05-09 | 2017-05-09 |
| Weinschel Corp | Attenuator(20dB) | 53-20-34 | LN749 | 2016-05-08 | 2017-05-08 |
| E-Microwave | DC Blocking | EMDCB-00036 | 0E01201047 | 2016-05-06 | 2017-05-06 |
| N/A | Coaxial Cable | 0.1m | N/A | 2016-05-06 | 2017-05-06 |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

Adjust the spectrum analyzer for the following settings:

- 1) Resolution Bandwidth = 100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
- 2) Video Bandwidth ≥ 3 times the resolution bandwidth.
- 3) Sweep Speed ≤ 2000 Hz per second.
- 4) Detector Mode = mean or average power.

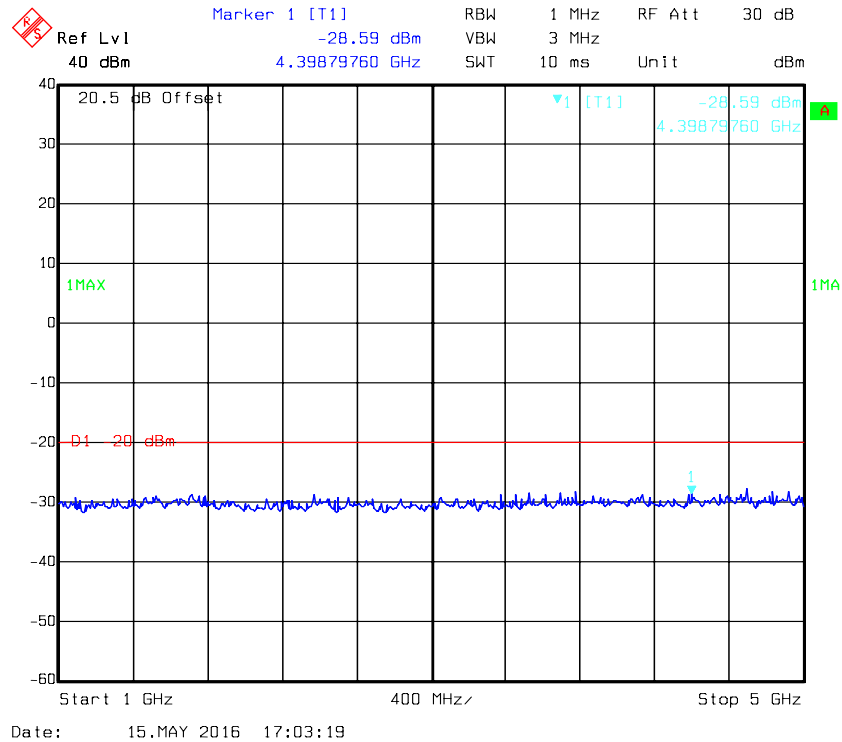
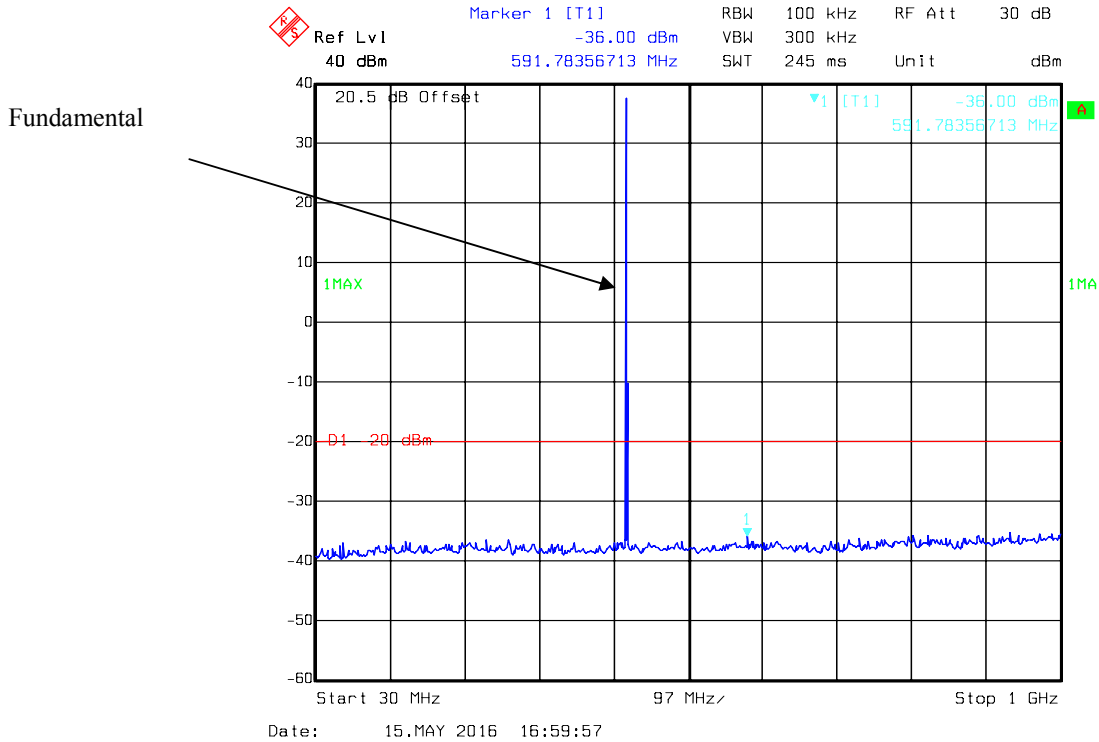
Test Data**Environmental Conditions**

| | |
|---------------------------|-----------|
| Temperature: | 27.5°C |
| Relative Humidity: | 54 % |
| ATM Pressure: | 100.6 kPa |

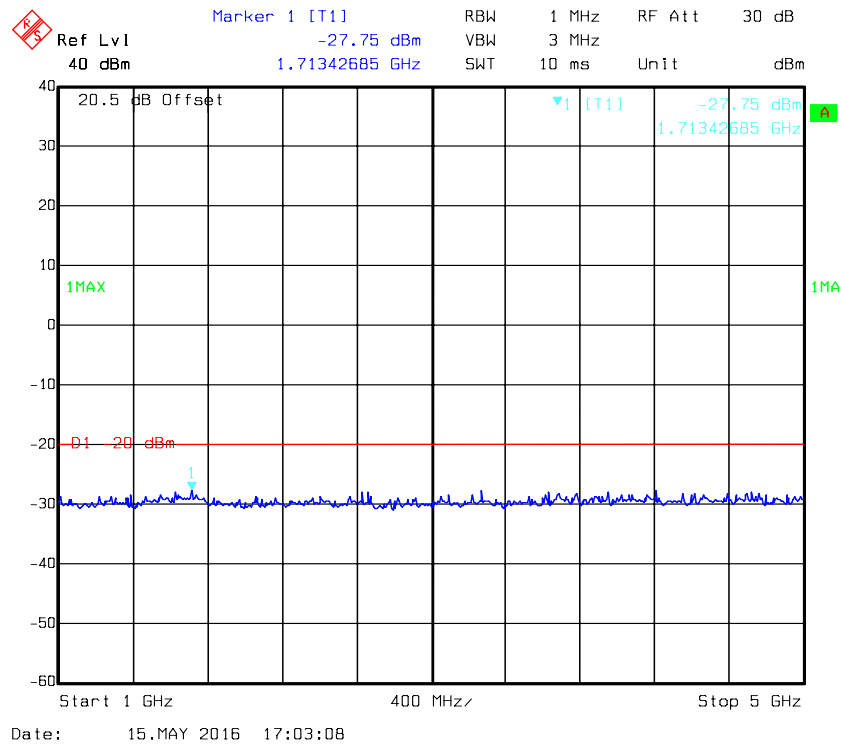
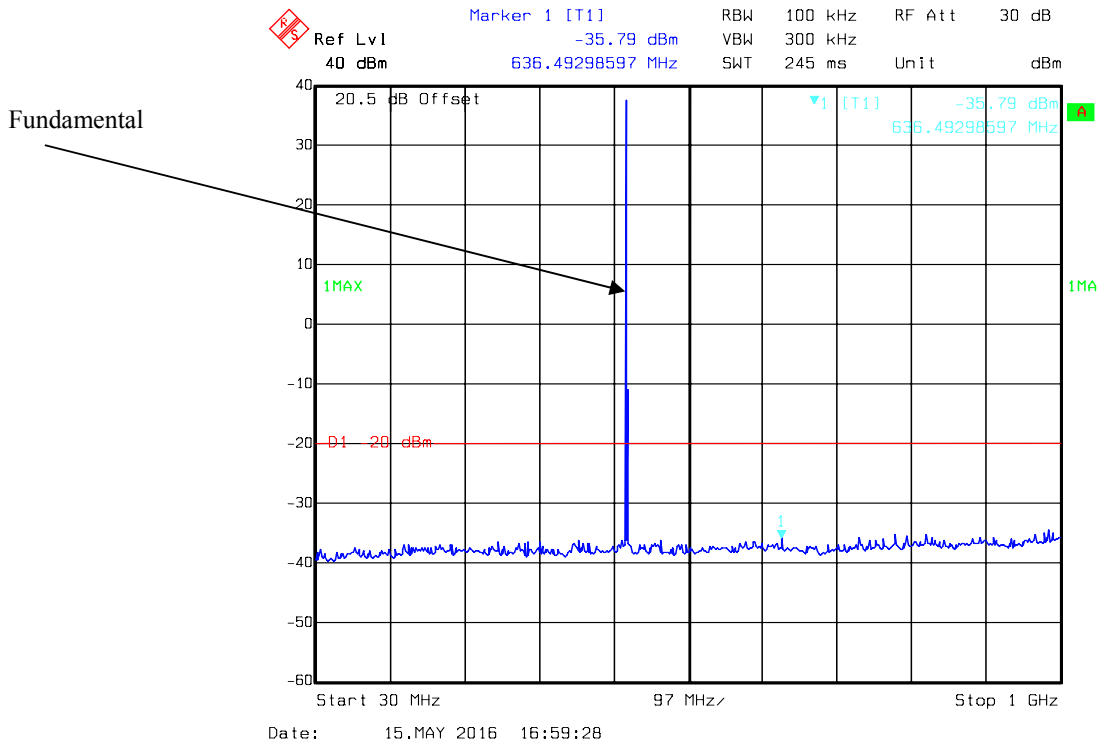
The testing was performed by Costa Dong on 2016-05-15.

Note: For conducted spurious emissions were tested at high rated power, which was the worst case.

435MHz – FM Mode, 12.5 kHz



435 MHz – 4FSK Mode, 12.5 kHz



FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 and §22.359 and §90.210

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|---------------------------|-------------|--------------------|------------------|----------------------|
| HP | Signal Generator | 1026 | 320408 | 2015-11-23 | 2016-11-22 |
| R&S | EMI Test Receiver | ESCI | 100224 | 2015-08-03 | 2016-08-02 |
| Sunol Sciences | Antenna | JB3 | A060611-3 | 2014-11-06 | 2017-11-05 |
| HP | Amplifier | 8447E | 2434A02181 | 2015-09-01 | 2016-09-01 |
| Agilent | Spectrum Analyzer | E4440A | SG43360054 | 2015-11-23 | 2016-11-22 |
| ETS-Lindgren | Horn Antenna | 3115 | 9808-5557 | 2015-09-06 | 2018-09-06 |
| Mini-Circuit | Amplifier | ZVA-213-S+ | 054201245 | 2016-02-19 | 2017-02-19 |
| Ducommun Technologies | Horn Antenna | ARH-4223-02 | 1007726-01 1304 | 2014-06-16 | 2017-06-15 |
| EMCO | Adjustable Dipole Antenna | 3121C | 9109-753 | N/A | N/A |
| N/A | Coaxial Cable | 14m | N/A | 2016-05-06 | 2017-05-06 |
| N/A | Coaxial Cable | 8m | N/A | 2016-05-06 | 2017-05-06 |
| Mini-Circuits | HIGH PASS FILTER | BHP-550+ | YZU15801121 | 2016-05-06 | 2017-05-06 |
| Weinschel Corp | Terminal Load(100W) | 1440-3 | MD447 | / | / |

*** Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

For part 90:

Spurious emissions in dB = $10 \log_{10} (\text{TXpwr in Watts}/0.001)$ - the absolute level

Spurious attenuation limit in dB = $50 + 10 \log_{10}$ (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

Test Data

Environmental Conditions

| | |
|---------------------------|----------------|
| Temperature: | 25.9~26.1°C |
| Relative Humidity: | 73 % |
| ATM Pressure: | 100.2~100.3kPa |

The testing was performed by Costa Dong on 2016-05-25 and 2016-06-23.

Test Mode: Transmitting-High power level is the worst case.

FM Mode:

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
| | | | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| frequency: 435.000 MHz | | | | | | | | |
| 870.000 | H | 47.15 | -27.5 | 0.0 | 1.0 | -28.5 | -20.0 | 8.5 |
| 870.000 | V | 42.22 | -29.2 | 0.0 | 1.0 | -30.2 | -20.0 | 10.2 |
| 1305.000 | H | 46.79 | -53 | 8.3 | 1.3 | -46.0 | -20.0 | 26.0 |
| 1305.000 | V | 43.70 | -56.6 | 8.3 | 1.3 | -49.6 | -20.0 | 29.6 |
| 1740.000 | H | 45.10 | -55.6 | 10.9 | 1.4 | -46.1 | -20.0 | 26.1 |
| 1740.000 | V | 42.66 | -58.3 | 10.9 | 1.4 | -48.8 | -20.0 | 28.8 |
| 2175.000 | H | 32.80 | -63 | 10.9 | 1.9 | -54.0 | -20.0 | 34.0 |
| 2175.000 | V | 34.17 | -61.2 | 10.9 | 1.9 | -52.2 | -20.0 | 32.2 |
| 2610.000 | H | 37.21 | -57.4 | 13.2 | 2.5 | -46.7 | -20.0 | 26.7 |
| 2610.000 | V | 42.21 | -55 | 13.2 | 2.5 | -44.3 | -20.0 | 24.3 |
| 3045.000 | H | 35.34 | -62.4 | 13.6 | 2.4 | -51.2 | -20.0 | 31.2 |
| 3045.000 | V | 38.20 | -59.5 | 13.6 | 2.4 | -48.3 | -20.0 | 28.3 |
| 3480.000 | H | 34.20 | -62.6 | 13.8 | 2.1 | -50.9 | -20.0 | 30.9 |
| 3480.000 | V | 35.59 | -60.3 | 13.8 | 2.1 | -48.6 | -20.0 | 28.6 |
| 3915.000 | H | 36.90 | -56.3 | 13.5 | 3.2 | -46.0 | -20.0 | 26.0 |
| 3915.000 | V | 35.17 | -57 | 13.5 | 3.2 | -46.7 | -20.0 | 26.7 |

4FSK Mode:

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
| | | | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| frequency: 435.000 MHz | | | | | | | | |
| 870.000 | H | 47.73 | -26.9 | 0.0 | 1.0 | -27.9 | -20.0 | 7.9 |
| 870.000 | V | 44.11 | -27.3 | 0.0 | 1.0 | -28.3 | -20.0 | 8.3 |
| 1305.000 | H | 47.15 | -52.7 | 8.3 | 1.3 | -45.7 | -20.0 | 25.7 |
| 1305.000 | V | 44.87 | -55.5 | 8.3 | 1.3 | -48.5 | -20.0 | 28.5 |
| 1740.000 | H | 44.47 | -56.2 | 10.9 | 1.4 | -46.7 | -20.0 | 26.7 |
| 1740.000 | V | 42.17 | -58.8 | 10.9 | 1.4 | -49.3 | -20.0 | 29.3 |
| 2175.000 | H | 32.76 | -63 | 10.9 | 1.9 | -54.0 | -20.0 | 34.0 |
| 2175.000 | V | 33.95 | -61.4 | 10.9 | 1.9 | -52.4 | -20.0 | 32.4 |
| 2610.000 | H | 37.75 | -56.9 | 13.2 | 2.5 | -46.2 | -20.0 | 26.2 |
| 2610.000 | V | 42.92 | -54.3 | 13.2 | 2.5 | -43.6 | -20.0 | 23.6 |
| 3045.000 | H | 36.24 | -61.5 | 13.6 | 2.4 | -50.3 | -20.0 | 30.3 |
| 3045.000 | V | 39.46 | -58.2 | 13.6 | 2.4 | -47.0 | -20.0 | 27.0 |
| 3480.000 | H | 34.54 | -62.3 | 13.8 | 2.1 | -50.6 | -20.0 | 30.6 |
| 3480.000 | V | 36.33 | -59.6 | 13.8 | 2.1 | -47.9 | -20.0 | 27.9 |
| 3915.000 | H | 39.63 | -53.5 | 13.5 | 3.2 | -43.2 | -20.0 | 23.2 |
| 3915.000 | V | 36.22 | -55.9 | 13.5 | 3.2 | -45.6 | -20.0 | 25.6 |

Note1: For radiated spurious emissions were tested at high rated power, which was the worst case.

Note2: The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.

Note3: Absolute Level = SG Level - Cable loss + Antenna Gain
Margin = Limit-Absolute Level

FCC §2.1055 & §90.213- FREQUENCY STABILITY

Applicable Standard

FCC §2.1055, §90.213

Test Equipment List and Details

| Manufacturer | Description | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|----------------|-------------------------------|-------------|-------------|------------------|----------------------|
| R&S | Spectrum Analyzer | FSP 38 | 100478 | 2015-11-23 | 2016-11-22 |
| Dongzhixu | High Temperature Test Chamber | DP1000 | 201105083-4 | 2015-09-10 | 2016-09-09 |
| UNI-T | Multimeter | UT39A | M130199938 | 2016-04-10 | 2017-04-10 |
| Weinschel Corp | Attenuator(20dB) | 53-20-34 | LN749 | 2016-05-08 | 2017-05-08 |
| E-Microwave | DC Blocking | EMDCB-00036 | 0E01201047 | 2016-05-06 | 2017-05-06 |
| N/A | Coaxial Cable | 0.1m | N/A | 2016-05-06 | 2017-05-06 |

* **Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The power leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

Test Data

Environmental Conditions

| | |
|---------------------------|----------|
| Temperature: | 28.7°C |
| Relative Humidity: | 61 % |
| ATM Pressure: | 100.2kPa |

The testing was performed by Costa Dong on 2016-05-25.

Test Mode: Transmitting

| Reference Frequency: 435 MHz, 12.5 kHz, Limit: 2.5 ppm | | | |
|--|-----------------|------------|-----------------|
| Temperature | Voltage | Reading | Frequency Error |
| °C | V _{DC} | MHz | ppm |
| -30 | 7.4 | 434.999952 | -0.11 |
| -20 | | 434.999948 | -0.12 |
| -10 | | 434.999949 | -0.12 |
| 0 | | 434.999977 | -0.05 |
| 10 | | 434.999967 | -0.08 |
| 20 | | 434.999976 | -0.06 |
| 30 | | 434.999971 | -0.07 |
| 40 | | 434.999968 | -0.07 |
| 50 | | 434.999960 | -0.09 |
| 60 | | 434.999930 | -0.16 |
| 25 | | 434.999968 | -0.07 |
| 25 | 6.3 | 434.999954 | -0.11 |

| Reference Frequency: 435 MHz, 12.5 kHz, Limit: 2.5 ppm | | | |
|--|-----------------|------------|-----------------|
| Temperature | Voltage | Reading | Frequency Error |
| °C | V _{DC} | MHz | ppm |
| -30 | 7.95 | 434.999973 | -0.06 |
| -20 | | 434.999912 | -0.20 |
| -10 | | 434.999945 | -0.13 |
| 0 | | 434.999938 | -0.14 |
| 10 | | 434.999962 | -0.09 |
| 20 | | 434.999956 | -0.10 |
| 30 | | 434.999929 | -0.16 |
| 40 | | 434.999962 | -0.09 |
| 50 | | 434.999971 | -0.07 |
| 60 | | 434.999948 | -0.12 |
| 25 | | 434.999993 | -0.02 |
| 25 | 6.3 | 434.999954 | -0.11 |

Note: Battery operating end point is declared by applicant.

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

Regulations: FCC §90.214

Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

Test Equipment List and Details

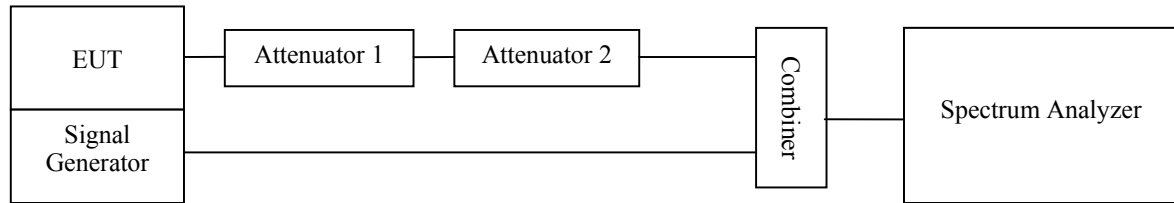
| Manufacturer | Description | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|------------------------|------------------------|----------------------|------------|------------------|----------------------|
| R&S | Spectrum Analyzer | FSEM | DE31388 | 2016-05-09 | 2017-05-09 |
| HP | Signal Generator | E4422B | MY41000355 | 2015-11-23 | 2016-11-22 |
| Cheng Du Ou Li Tong | Two way power splitter | EMPD-T- 2-10-1000 | OE01201041 | 2016-05-06 | 2017-05-06 |
| Weinschel Corp | Attenuator(20dB) | 53-20-34 | LN749 | 2016-05-08 | 2017-05-08 |
| E-Microwave | DC Blocking | EMDCB- 00036 | 0E01201047 | 2016-05-06 | 2017-05-06 |

* Statement of Traceability: Bay Area Compliant Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

- Connect the EUT and test equipment as shown on the following block diagram.
- Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
- Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at ± 12.5 kHz deviation and set its output level to -100dBm.
- Turn on the transmitter.
- Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as P_0 .
- Turn off the transmitter.
- Adjust the RF level of the signal generator to provide RF power equal to P_0 . This signal generator RF level shall be maintained throughout the rest of the measurement.
- Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
- Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at ± 4 divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "trigger offset" to -10ms for turn on and -15ms for turn off.
- Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be t_{on} . The trace should be maintained within the allowed divisions during the period t_1 and t_2 .

- k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period t_3 .



Test Data

Environmental Conditions

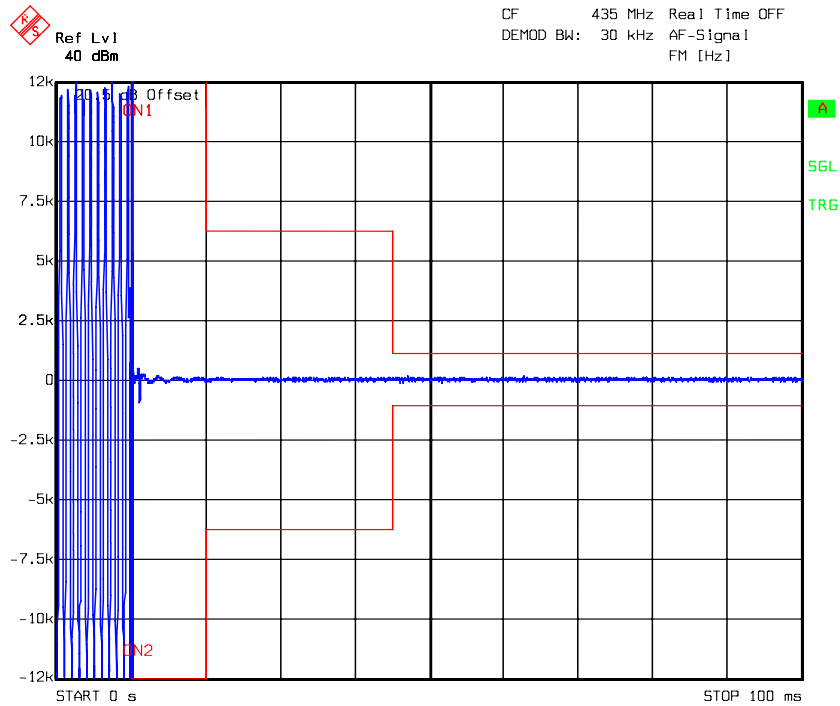
| | |
|---------------------------|----------|
| Temperature: | 25.1°C |
| Relative Humidity: | 54 % |
| ATM Pressure: | 100.6kPa |

The testing was performed by Costa Dong on 2016-05-16 .

| Channel Spacing (kHz) | Transient Period (ms) | Maximum frequency difference | Result |
|--------------------------|--------------------------|---------------------------------|--------|
| 12.5 | 10(t_1) | ± 12.5 kHz | Pass |
| | 25(t_2) | ± 6.25 kHz | |
| | 10(t_3) | ± 12.5 kHz | |

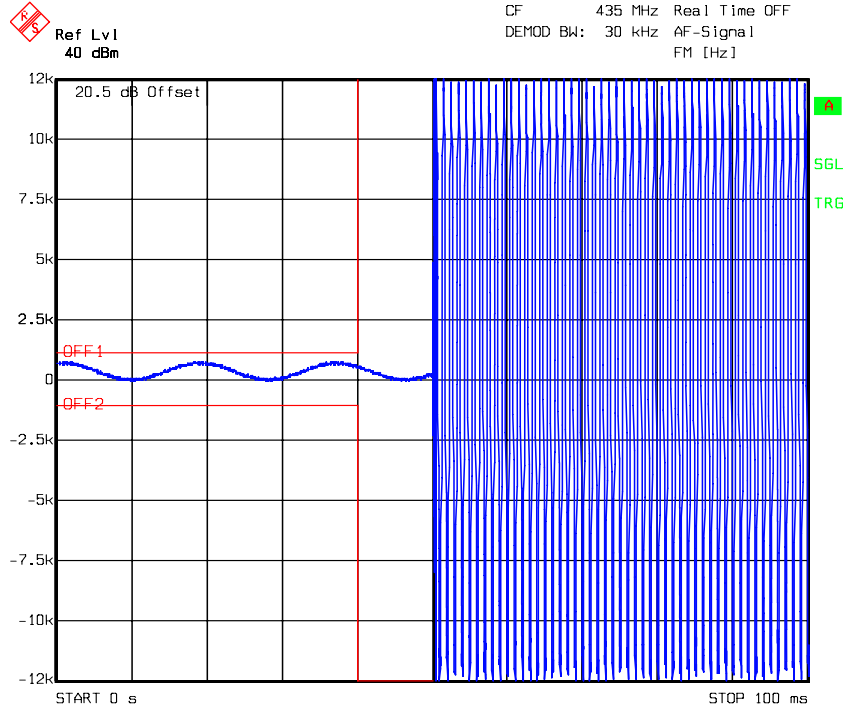
Please refer to the following plots.

Turn on – 435 MHz, FM Mode 12.5 kHz



Date: 16.MAY 2016 20:37:19

Turn off – 435 MHz, FM Mode 12.5 kHz



Date: 16.MAY 2016 20:49:36

***** END OF REPORT *****